IN THE CLAIMS

This listing of claims will replace all prior versions, and listings, of claims in the application.

1. (original) A parser program to parse mathematical optimization problems, wherein a geometric program is converted from a set of algebraic expressions to a compact numeric format that can be accepted by a computer-aided geometric program solver.

2. (original) The parser of claim 1, wherein said geometric program is comprised of an objective and a set of one or more constraints.

3. (original) The parser in claim 2, wherein:

said objective includes an expression of one or more mathematical terms; and

each constraint in said set includes either an inequality or equality of one or more mathematical terms.

4. (original) The parser in claim 2, wherein:

each mathematical term includes one or more optimization variables.

5. (original) A computer-implemented method of parsing a mathematical optimization problem comprising:

reading a plurality of algebraic expressions that represent a mathematical optimization problem, each algebraic expression in said plurality having one or more mathematical terms;

creating a set of signomial expressions by converting each of said mathematical terms to a signomial; and

converting said set of signomial expressions to a compact numeric format to be accepted by a computer-aided geometric program solver.

6. (original) The method of Claim 5, wherein said algebraic expressions include an objective and a set of one or more constraints.

7. (original) The method in claim 6, wherein:

said objective includes an expression of one or more mathematical terms; and

each constraint in said set includes either an inequality or equality of one or more mathematical terms.

8. (original) The method in claim 7, wherein:

each mathematical term includes one or more optimization variables.

9. (original) The method of Claim 5, further comprising:

prior to said converting, determining that all signomial expressions

in said set reduce to either a posynomial objective, a posynomial inequality or a monomial inequality;

after said determining, identifying that said mathematical optimization problem is a geometric program.

10. (original) The method of Claim 5, further comprising:

prior to said converting, determining that at least one of said signomial expressions in said set cannot be reduced to either a posynomial objective, a posynomial inequality or a monomial inequality;

after said determining, reporting to a user which of said signomial expressions in said set cannot be reduced to either a posynomial objective, a posynomial inequality or a monomial inequality.

11. (original) The method of Claim 10, further comprising the step of:

simplifying each signomial expression in said set by mathematically canceling a combination of a plurality of said signomials.

12. (original) A computer-implemented method of parsing a mathematical optimization problem comprising:

reading a plurality of algebraic expressions that represent a mathematical optimization problem, each algebraic expression in said plurality having one or more mathematical terms;

identifying that said algebraic expressions form a geometric program; and

converting said plurality of algebraic expressions to a compact numeric format to be accepted by a computer-aided geometric program solver.

13. (original) The method of Claim 12, wherein said algebraic expressions include an objective and a set of one or more constraints.

14. (original) The method in claim 13 wherein:

said objective includes an expression of one or more mathematical terms; and

each constraint in said set includes either an inequality or equality of one or more mathematical terms.

15. (original) The method in claim 14, wherein:

each mathematical term includes one or more optimization variables.

16. (original) The method of claim 12, further comprising:

prior to said identifying, creating a set of signomial expressions by converting each of said mathematical terms to a signomial; and

after said creating, determining that all signomial expressions in said set reduce to either a posynomial objective, a posynomial inequality or a monomial inequality.

17. (original) The method of Claim 16, further comprising:

prior to said identifying, determining for each algebraic expression in said plurality that a mathematical combination of said mathematical terms form either a posynomial objective, a posynomial inequality or a monomial inequality.

18. (original) A computer-readable medium for parsing a geometric program comprising:

a user interface to accept a plurality of algebraic expressions that represent a mathematical optimization problem, each algebraic expression in said plurality having one or more mathematical terms;

an expression verifier coupled to said user interface to identify that said algebraic expressions form a geometric program; and

a matrix generator coupled to said to expression verifier to convert said plurality of algebraic expressions to a compact numeric format to be accepted by a computer-aided geometric program solver.

19. (original) The computer-readable medium of Claim 18, wherein said algebraic expressions include an objective and a set of one or more constraints.

20. (original) The computer-readable medium in claim 19, wherein:

said objective includes an expression of one or more mathematical terms; and

each constraint in said set includes either an inequality or equality

of one or more mathematical terms.

21. (original) The computer-readable medium in claim 20, wherein:

each mathematical term includes one or more optimization variables.

22. (original) The computer-readable medium of Claim 18, further comprising:

an expression reducer to simplify each algebraic expression of said plurality by mathematically canceling a combination of a plurality of said mathematical terms.

COMMENTS

The enclosed is responsive to the Examiner's Office Action mailed on February 11, 2004. At the time the Examiner mailed the Office Action claims 1 through 22 were pending. By way of the present response the Applicant has neither amended nor canceled any claims. As such, claims 1 through 22 remain pending.

Independent Claim 1

Independent claim 1 stands rejected as being obvious under 35 USC 103(a) in light of the combination of the Applicant's own submitted art "A Parser/Solver for Semidefinite Programs with Matrix Structure", Technical Report, Information System Laboratory, Stanford University, November 1995 (hereinafter, "Shao-Po") and US Patent No. 6,311,145 (hereinafter, "Hershenson"). Claim 1 recites:

> 1. (original) A parser program to parse mathematical optimization problems, wherein a geometric program is converted from a set of algebraic expressions to a compact numeric format that can be accepted by a computer-aided geometric program solver.

According to the Examiner,

> "Shao-Po discloses a parser program to parse mathematical optimization problems, where a optimization language . . . is converted from a set of algebraic expressions . . . to a compact numeric format that can be accepted by a computer-based program solver"

but

> "Shao-Po does not specify that the optimization program is a geometric program, nor does Shao-Po disclose converting a set of

> algebraic expressions to a numeric format that can be accepted by a geometric program solver." See, Office Action mailed 2/11/04, pg 2.

Moreover, the Examiner has found that

> "Hershenson . . .discloses optimizing complex non-linear circuit problems (e,g,., induction or RF mathematics like [the] Shao-Po spring system) and expressing the constraints or inequalities into posynomials and submitting these to [a] solver using a geometric programming language." See, Office Action mailed 2/11/04, pgs 2-3.

The above statements taken together essentially shows that the Examiner has found that:

1) Shao-Po teaches parsing but does not teach or suggest geometric programming; and,

2) Hershenson teaches geometric programming but does not teach or suggest parsing.

Thus, the Examiner has effectively admitted that no suggestion exists to combine the Shao-Po and Hershenson references.

In establishing a theory of rejection under 35 USC 103, the Examiner is required to find some suggestion in the prior art to combine the applied references. "To establish a *prima facie* case of obviousness ... the prior art reference (or references when combined) must teach or suggest all the claim limitations." MPEP 2143. Yet the Examiner's own reasoning manifestly declares that no such motivation exists. Without some statement in Shao-Po that the parsing of Shao-Po could be assisted with geometric programming; or, without some statement in Hershenson that the geometric programming of Hershenson could be applied to parsing – it is self evident that no suggestion exists to combine the Shao-Po and Hershenson references.

The Examiner has correctly found that such statements do not exist in either the Shao-Po or Hershenson references. Therefore no suggestion exists to combine these references. Therefore the Examiner's rejection is improper. The Applicant respectfully requests the Examiner to articulate a clear suggestion in the prior art to combine the Shao-Po and Hershenson references; or, to remove the outstanding rejection applied against claim 1. Because the Applicant believes the Examiner will not be able to articulate a clear suggestion, the Applicant respectfully submits that the claim 1 is patentable and should be allowed to pass to issuance.

Independent Claim 5

Independent claim 5 stands rejected as being obvious under 35 USC 103(a) in light of the combination of the Shao-Po and Hershenson references. Claim 5 recites:

> 5. (original) A computer-implemented method of parsing a mathematical optimization problem comprising:
> reading a plurality of algebraic expressions that represent a mathematical optimization problem, each algebraic expression in said plurality having one or more mathematical terms;
> creating a set of signomial expressions by converting each of said mathematical terms to a signomial; and
> converting said set of signomial expressions to a compact numeric format to be accepted by a computer-aided geometric program solver.

According to the Examiner,

> "Shao-Po does not specify that the mathematical terms or constraints are converted into a set of signomial expressions; nor does Shao-Po specify converting those set of signomial expressions into a compact numeric format accepted by the program solver."
> See, Office Action mailed 2/11/04, pg 4.

Moreover, the Hershenson reference simply does not disclose the use of signomial expressions. That the Hershenson reference does not disclose the use of signomial expressions is apparent through comparison of the present application and the Hershenson reference. Page 6, lines 7-8 of the present application state "[a] signomial is a function with the same form as a posynomial, as defined above, where the coefficients c_j are allowed to be negative". The definition of the posynomial that appears at the bottom of page 5 of the present application is the same as the definition of a posynomial that is presented at Col. 3, lines 20 – 30. The Hershenson reference makes no mention that the c_j coefficient can be negative and never uses the term signomial. Therefore the Hershenson reference is silent with respect to the uses of signomial expressions.

"To establish a *prima facie* case of obviousness ... the prior art reference (or references when combined) must teach or suggest all the claim limitations." MPEP 2143. With both the Shao-Po and Hershenson references failing to disclose the use of signomial expressions. The Applicant respectfully submits that it is impossible for the combination of the Shao-Po and Hershenson references to cover each and every element of independent claim 5 of the present application. That is, because the prior art that has been applied by the Examiner fails to teach any matter related to signomial expressions; and because independent claim 5 makes use of the term "signomial expressions" – it is readily apparent that the Examiner has improperly rejected independent claim 5. Therefore the Applicant respectfully submits that independent claim 5 is allowable and the outstanding rejection against it should be removed.

Independent claim 12

The Examiner stated that claim 12 is rejected as being obvious in light of the combination of the Shao-Po reference and the Hershenson reference (See, Office Action mailed 2/11/04, pg. 2). Independent claim 12 recites

> 12. (original) A computer-implemented method of parsing a mathematical optimization problem comprising:
> reading a plurality of algebraic expressions that represent a mathematical optimization problem, each algebraic expression in said plurality having one or more mathematical terms;
> identifying that said algebraic expressions form a geometric program; and
> converting said plurality of algebraic expressions to a compact numeric format to be accepted by a computer-aided geometric program solver.

The Examiner failed to elaborate on the reasoning behind the rejection for independent claim 12 in that the use of the Hershenson reference in the Examiner's rejection was never actually discussed. The Examiner's only reference to the applicability of the Hershenson reference seems to be that the same theory used with respect to independent claim 5 should be used with respect to claim 12 ("[the limitations of Shao-Po] have been addressed in claim 5 above", Examiner's Office Action mailed 2/11/04, pg. 8). However, this line of reasoning appears to be mis-directed because the Hershenson reference was used to cover the "signmial expressions" of independent claim 5 whereas independent claim 12 contains no such element. The Examiner did state that

> "Shao-Po does not specify identifying that the algebraic expressions form a geometric program; nor does Shao-Po specify converting those set of algebraic expressions into a compact numeric format accepted by a computer-aided geometric program solver." See, Office Action mailed 2/11/04, pgs. 7-8.

Thus, once again, the Examiner has admitted that the Shao-Po reference fails to suggest the use of geometric programming.

As described above with respect to independent claim 1, the Hershenson reference fails to disclose the application of geometric programming to parsing. Therefore, the Applicant respectfully submits that no suggestion exists in the prior art to combine the Shao-Po and Hershenson references. The Applicant respectfully submits that the Examiner should either put forth a clear suggestion in the prior art that justifies the combination of these references; or, allow independent claim 12 to pass to issuance.

Independent claim 18

Independent claim 18 stands rejected under 35 USC 103 in light of the Shao-Po and Hershenson references(See, Office Action mailed 2/11/04, pg. 2). Independent claim 18 recites:

> 18. (original) A computer-readable medium for parsing a geometric program comprising:
> a user interface to accept a plurality of algebraic expressions that represent a mathematical optimization problem, each algebraic expression in said plurality having one or more mathematical terms;
> an expression verifier coupled to said user interface to identify that said algebraic expressions form a geometric program; and
> a matrix generator coupled to said to expression verifier to convert said plurality of algebraic expressions to a compact numeric format to be accepted by a computer-aided geometric program solver.

As with independent claim 12, the Examiner failed to elaborate on the reasoning behind the rejection for independent claim 18 in that the use of the Hershenson reference in the Examiner's rejection was never actually discussed. The Examiner's only reference to the applicability of the Hershenson reference seems

to be that the same theory used with respect to independent claim 5 should be used with respect to claim 18 ("[the limitations of Shao-Po] are rejected using herein using the rationale as set forth in claim 5 above", Examiner's Office Action mailed 2/11/04, pg. 9). However, this line of reasoning appears to be mis-directed because the Hershenson reference was used to cover the "signmial expressions" of independent claim 5 whereas independent claim 18 contains no such element. The Examiner did state that

> Shao-Po does not specify a verifier to identify that said algebraic expressions form a geometric program; nor accepting of a compact numeric format by a geometric program solver. See, Examiner's Office Action mailed 2/11/04, pg. 8

Thus, the Examiner admits that the Shao-Po reference does not teach or suggest any application of geometric programming. Moreover, as described at length above, the Hershenson reference fails to make any reference to parsing. Therefore, the Applicant respectfully submits that there exists no motivation to combine the Shao-Po and Hershenson references; and, as a consequence, the Examiner's rejection is improper because a finding of a suggestion to combine the references must be found in the prior art. The Applicant respectfully requests the Examiner to either recite a suggestion to combine these references, or, in the alternative, to allow independent claim 18.

Because the Applicant has demonstrated that each of the independent claims are allowable over the applied prior art, the Applicant respectfully submits that all pending claims are allowable; and, the Applicant respectfully requests the allowance of same.